Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**How much energy does it contain? Cheesypuffs vs Marshmallows**

1.) Find the mass of 1 marshmallow. Record it in your data in the data table.

2.) Measure out exactly 30 mL of tap water.

3.) Pour 30 mL of water into a beaker.

4.) Set up as demonstrated by the teacher.

5.) Mass a toothpick and a ball of clay, record in your data table.

6.) Place the marshmallow on a toothpick, place toothpick in the clay. Set under the beaker, as

close to the beaker as possible.

7.) Record the initial temperature of the water

8.) Light the marshmallow on fire.

9.) If the marshmallow goes out, keep relighting it until it is no longer capable of being lit.

10.) Record the final temperature of the water.

11.) Record the mass of the toothpick and left over marshmallow.

12.) Repeat the experiment, only this time use a cheese puff.

Data Table

|  |  |
| --- | --- |
| Mass of marshmallow |  |
| Mass of water (remember you don’t have to weight it, 1 mL = 1 g of water) |  |
| Mass of toothpick |  |
| Mass of clay |  |
| Temperature of water (initial) |  |
| Temperature of water (final) |  |
| Mass of toothpick and marshmallow |  |

|  |  |
| --- | --- |
| Mass of cheese puff |  |
| Mass of water (remember 1 mL = 1 g of water) |  |
| Mass of toothpick |  |
| Mass of clay |  |
| Temperature of water (initial) |  |
| Temperature of water (final) |  |
| Mass of toothpick and cheese puff |  |

Formulas and conversion factor you will need:

Q = mC∆T

1 calorie = 4.18 joules

1 food calorie = 1000 calories

Percent error =

1.) Determine how much energy was needed to change the temperature of the water in the

marshmallow experiment. Your answer will be in joules. Show your work!

2.) Assume all of the heat gained by the water was lost by the marshmallow. How much heat was

lost by the marshmallow?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Joules

3.) Determine how many calories were in your marshmallow. Show your work!

4.) Determine how many food calories were in your marshmallow. Show your work!

5.) Determine your percent error, show your work!

6.) Determine how much energy was needed to change the temperature of the water in the cheese

puff experiment. Your answer will be in joules. Show your work!

7.) Assume all of the heat gained by the water was lost by the cheese puff. How much heat was

lost by the cheese puff?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Joules

8.) Determine how many calories were in your cheese puff. Show your work!

9.) Determine how many food calories were in your cheese puff. Show your work!

10.) Determine your percent error, show your work!

11.) What is specific heat?

12.) Determine the heat of combustion of the marshmallow. Use the formula Q = mHc. (Heat of vaporization is similar in definition to heat of combustion). Q you found in question 2, mass you measured and can be found in the data table but we want the mass used so find the difference between in the mass before and after heating and use that mass,, Hc is what you are solving for. Show your work!

13.) Determine the heat of combustion of the cheese puff. Use the formula Q = mHc. (Heat of vaporization is similar in definition to heat of combustion). Q you found in question 7, mass you measured and can be found in the data table but we want the mass used so find the difference between in the mass before and after heating and use that mass, Hc is what you are solving for. Show your work!

14.) Which food that you tested contains the greatest amount of energy? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

How did you know?